June 14, 1932. A. L. KRONQUEST 1,863,446

PROCESS OF FORMING AND STORING CYLINDRICAL CAN BODIES

Filed Oct. 17, 1929 2 Sheets-Sheet 1

Fig. 1.

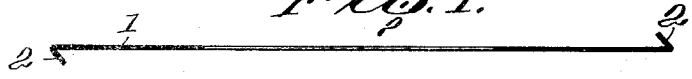


Fig. 2.

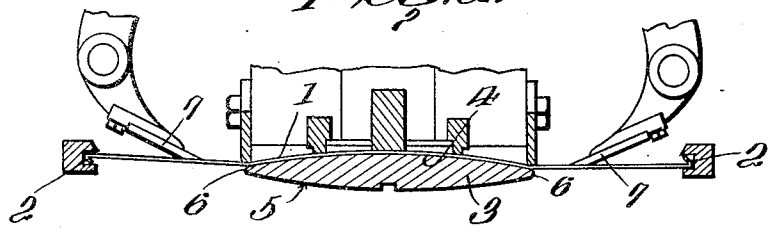


Fig. 3.

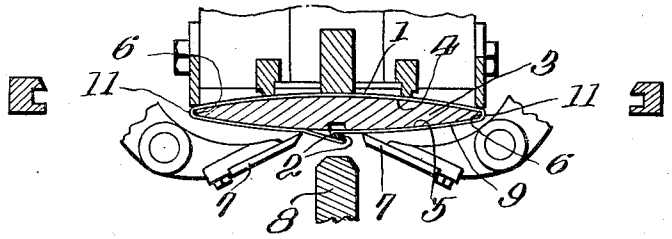
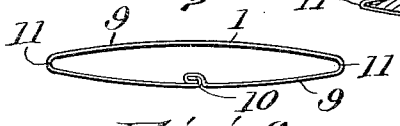


Fig. 5.



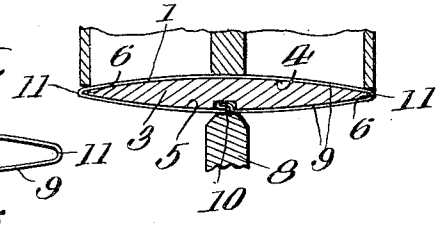


Fig. 4.

Fig. 6.

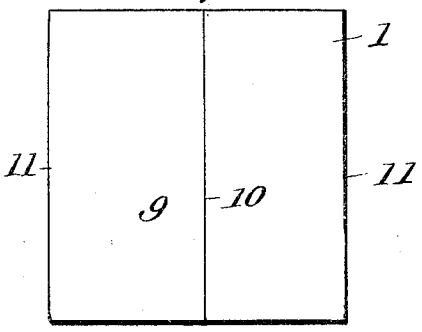
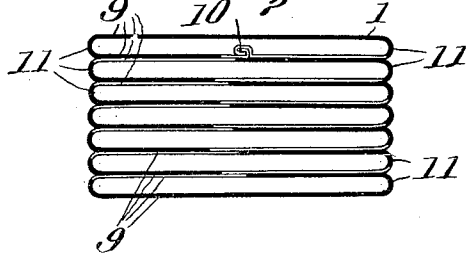


Fig. 7.



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PROCESS OF FORMING AND STORING CYLINDRICAL CAN BODIES

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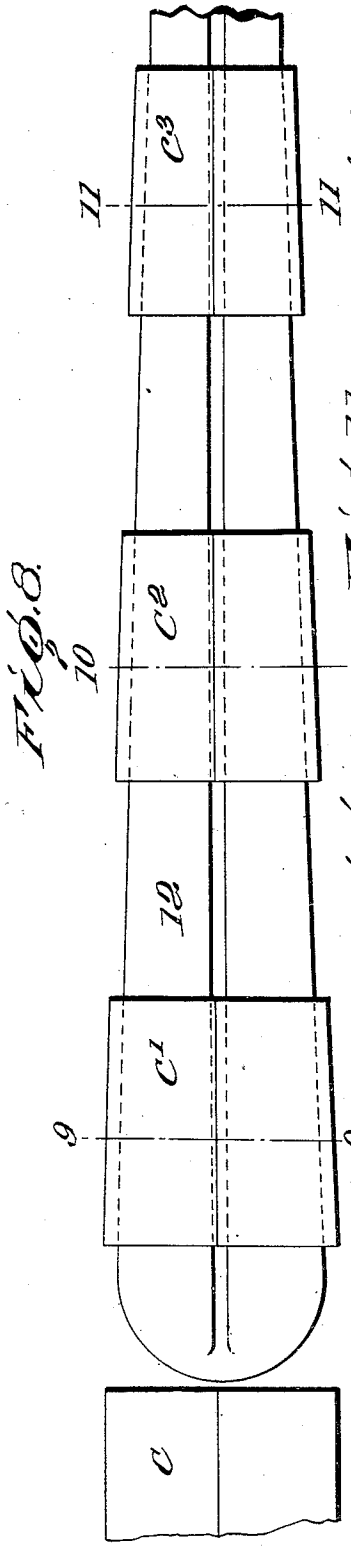

Fig. 8.

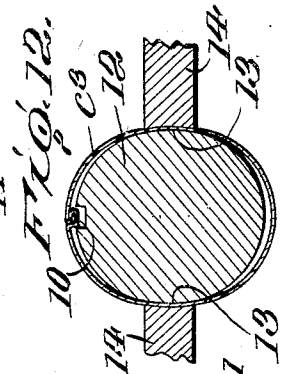

Fig. 12.

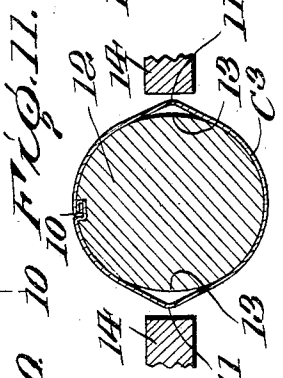

Fig. 11.

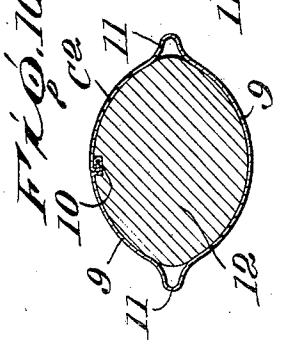

Fig. 10.

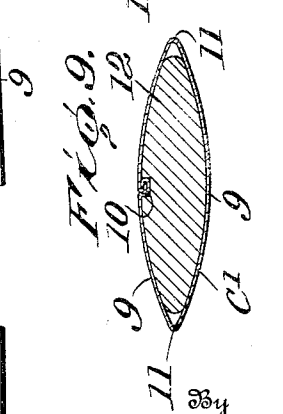

Fig. 9.

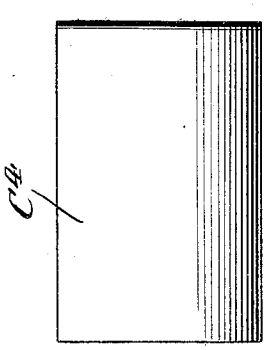

Fig. 14.

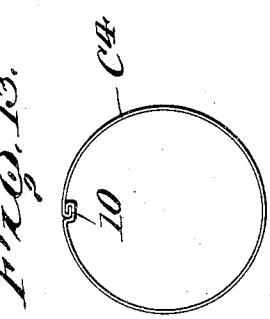

Fig. 13.

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1,863,446

UNITED STATES PATENT OFFICE

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PROCESS OF FORMING AND STORING CYLINDRICAL CAN BODIES

Application filed October 17, 1929. Serial No. 400,329.

The invention relates to new and useful improvements in a process of forming and storing metal can bodies, and more particularly cylindrical can bodies. It is well known that a cylindrical can body occupies considerable space when stored, and that this is objectionable particularly when can bodies are stored for transit to distant places.

An object of the present invention is to provide a process of making can bodies wherein the body is initially formed so that opposed walls are in juxtaposition whereby one body may be stored on another in a minimum space and wherein the initially formed body is subsequently expanded to produce a can body of a predetermined shape for use.

A further object of the invention is to provide a process for forming cylindrical can bodies wherein the metal is initially formed into a convexo-convex body and subsequently expanded and bumped into cylindrical form.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show diagrammatically the various steps of the method and the article produced:—

Figure 1 is an edge view of a body blank used for forming the cylindrical can body.

Fig. 2 is a view in section showing the horn, the body blank placed on the horn, and diagrammatically the devices for folding the body blank about the horn.

Fig. 3 is a similar view showing the edges of the body blank interlocked and ready for bumping.

Fig. 4 is a view showing the body on the horn and the edges bumped, thus finishing the body ready for soldering.

Fig. 5 is an end view of the completed convexo-convex can body.

Fig. 6 is a bottom plan view of the same.

Fig. 7 is a view showing the can body illustrated in Figs. 5 and 6 as stored for shipment or for other purposes.

Fig. 8 is a diagrammatic view showing the expanding horn and also showing the can body as passing over the horn whereby it is expanded into cylindrical form.

Fig. 9 is a sectional view on the line 9—9 of Fig. 8.

Fig. 10 is a sectional view on the line 10—10 of Fig. 8.

Fig. 11 is a sectional view on the line 11—11 of Fig. 8 showing in broken lines the bumping devices for rounding up the can body.

Fig. 12 is a view similar to Fig. 11 but showing the bumping devices as moved into engagement with the body for bumping the same into cylindrical form in the region at the ends of the convexo-convex shaped body.

Fig. 13 is an end view of the finished cylindrical can body.

Fig. 14 is a side view of the same.

The invention relates to improvements in a process of making can bodies. As the invention has particularly to do with the making of cylindrical can bodies it will be described as applied to the making and storing of such can bodies. The cylindrical can body is made from a flat blank the edges of which are joined by a side seam. This side seam may be of any desired character, but preferably is in the form of a lock and lap seam. The cylindrical body is adapted to be flanged and have ends joined thereto in the usual way.

In order to facilitate the storage and forming of the cylindrical bodies they are initially formed of a shape which enables them to be stored so as to occupy a minimum space. This shaping of the can body is preferably convexo-convex and the body is so proportioned that the opposed side walls can be forced into contact without bending the metal beyond its limit of recovery when released. To this end a body blank, if a lap and lock seam is to be used, has its edges provided with hooks to be interlocked, after which the body blank is bent or formed about a horn which is of a cross section desired for the initially finished can body, that is, convexo-convex. After the can body edges have been locked together and bumped, then the can body is presented to a suitable soldering mechanism and the side seam finished. Can bodies thus formed can be placed one on another and when stored, the side walls will bend into engagement or into juxtaposition so that the thick-

ness of the stored body at the center thereof can be no greater than the thickness of the metal in the two opposed sides of the convexo-convex body. The ends of the convexo-convex body are rounded on a radius very much less than the radius of the finished cylindrical body, but still sufficient so as to permit the portions at the ends later to be bumped into form so as to produce a cylindrical body substantially uniform in diameter throughout.

When it is desired to use the can body it is passed over a tapered mandrel which expands said body to substantial cylindrical form. The body is so proportioned, as noted, that when released after storage the side walls will spring apart and thus readily facilitate the passing of the body onto the expanding mandrel. The body is moved over said expanding mandrel which forces it into substantial cylindrical form, and when fully expanded the portions of the body at the ends of the convexo-convex shaped body are bumped so as to place these end portions substantially in the same form as the other portions of the body and thus a uniformly shaped cylindrical body is produced for use.

Referring more in detail to the drawings, the process of producing a cylindrical can body consists in providing a body blank 1 which is of the usual construction. Said body blank, if a lock and lap seam is to be provided, will have the edge portions bent so as to provide the hooks 2, 2. This blank is placed over a horn 3. The horn 3 in cross section is convexo-convex and is substantially the same shape and size as the initially finished can body. This horn is provided with an upper convex surface 4 and a lower convex surface 5. The ends or side edges of the horn are rounded, as shown at 6, 6. The can body blank is folded around this horn by means of folding blades 7, 7 which are shown diagrammatically in Figs. 2 and 3. These folding blades not only bend or shape the body blank about the horn, but bring about an interlocking of the edge portions as shown in Fig. 3 of the drawings. After the edges are interlocked they are then bumped by a bumping member shown diagrammatically at 8 in Fig. 4. Thus it is that the body is completed as to its shaping and joining of the side edges ready for soldering.

The body is then presented to a suitable soldering mechanism where the side edges are soldered. The finished can body, as shown in Figs. 5 and 6, includes opposed side walls 9, 9 which are convex and in the lower wall 9 is the side seam 10. The ends or side portions 11, 11 of the convexo-convex shaped can body are curved about a radius which is comparatively small and much smaller than the radius of the finished cylindrical can body. This radius, however, is sufficient so that the portion at the ends or side edges of the convexo-convex shaped body may be bumped into a shape so as to produce a cylindrical can body of uniform diameter throughout. The can body is so proportioned that one opposed side wall 9 may be pressed into engagement with the other opposed wall 9 at the central line of the convexo-convex shaped body without bending the metal beyond its limit of recovery when released.

In Fig. 7 of the drawings, the can bodies thus formed and completed are shown as stored, one upon the other, and the side walls 9, 9 moved to a position so that the distance between the side walls is no greater than the diameter of the curved portion at the ends or side edges of the convexo-convex shaped body. This enables the can bodies to be stored in a very small space as compared with the space occupied by cylindrical can bodies placed side by side. To accomplish this feat a tapered mandrel 12 is provided.

A can body is shown as being presented to this tapered mandrel at C. At C′ the can body has moved onto the mandrel and the expanding of the can body has commenced. In the position shown at C^2 the can body is still further expanded toward cylindrical form and in the position shown at C^3 it is expanded so that the vertical diameter of the body is substantially the same as the maximum diameter of the cylindrical can body desired.

The side walls of the mandrel 12 at the station indicated at C^3 are flattened as indicated at 13. At this station bumping members 14, 14 are brought into contact with the end portions of the convexo-convex shaped can body and this will form the sharply curved portion into a substantially flat portion so that when the bumping tools release the body it will spring out into substantially uniform diameter throughout.

In Fig. 13 of the drawings the can body indicated at C^4 is of substantially uniform diameter and ready for flanging and the attachment of the ends thereto.

It will be understood that in the initially formed can body the opposed side walls are not bent beyond the elastic limit of the metal as present in the flat blank from which the body is formed. The only portions of the body which are bent beyond the elastic limit of the metal are the small portions 11, 11 at the end of the convexo-convex shaped body. Therefore, the body can be readily expanded with little effort to cylindrical form and these limited portions where the metal is bent beyond the elastic limit shaped so as to provide a cylindrical body of uniform diameter throughout.

While I have described the invention as applied to a cylindrical can body it will be obvious that the process might be used in the forming and storing of can bodies which are rectangular or square in cross section or

otherwise shaped. The essential feature consists in the initial finishing of a can body which is shaped for storage in a relatively small space and the subsequent expanding of the initially formed can body into the normal shape of can body desired for use. As noted above, the side seam of the can body may be either a lock and lap seam or a lap seam throughout, or any desired form. While I prefer to bump the body to aid in expanding the same to cylindrical form, it will be understood that the completion of the expansion of the body into cylindrical form may be otherwise accomplished.

While I have shown the initially formed can body as convexo-convex in cross section, it will be understood that it may be otherwise shaped, the essential feature consisting in the shaping of the body initially for storage by a process wherein the grain of the body throughout the greater portion of its extent is not bent beyond its elastic limit as present in the flat blank.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

The process of storing and forming cylindrical can bodies consisting in bending a flat blank of metal around a horn convexo-convex in cross section and so proportioned that the opposed walls of the formed body curve circumferentially from the center line of the can body toward each other and meet at the side edges in a relatively small curved portion so that said opposed walls in the central section of the body and extending substantially to their outer edge portions may be bent into contact and will spring apart when released, uniting the side edges of the blank to form a side seam disposed between the side edge portions of one of the walls, storing the blanks for shipment by piling the same one on the other and subsequently expanding the body substantially into cylindrical form and applying pressure to the relatively small curved side edge portions of the body for shaping the body into true cylindrical form.

In testimony whereof, I affix my signature.

ALFRED L. KRONQUEST.